

Title (en)

METHOD FOR PRODUCING POLYUNSATURATED FATTY ACIDS IN TRANSGENIC PLANTS

Title (de)

VERFAHREN ZUR HERSTELLUNG MEHRFACH UNGESÄTTIGTEN FETTSÄUREN IN TRANSGENEN PFLANZEN

Title (fr)

PROCÉDÉ DE FABRICATION D'UNE PLURALITÉ D'ACIDES GRAS INSATURÉS DANS LES PLANTES TRANSGÉNIQUES

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Abstract (en)

[origin: US2009222951A1] The present invention relates to a process for the production of polyunsaturated fatty acids in the seed of transgenic plants for introducing, into the organism, nucleic acids which encode polypeptides with omega3-desaturase, Delta12-desaturase, Delta6-desaturase, Delta6-elongase, Delta5-desaturase, Delta5-elongase and/or Delta4-desaturase activity, preferably polypeptides with Delta6-desaturase, Delta6-elongase and Delta5-desaturase activity. The nucleic acid sequences are the sequences shown in SEQ ID NO: 11, SEQ ID NO: 27, SEQ ID NO: 193, SEQ ID NO: 197, SEQ ID NO: 199 and SEQ ID NO: 201. These nucleic acid sequences can advantageously be expressed in the organism, if appropriate together with further nucleic acid sequences which encode polypeptides of the biosynthesis of the fatty acid or lipid metabolism. Especially advantageous are nucleic acid sequences which encode a Delta6-desaturase, a Delta5-desaturase, Delta4-desaturase, Delta12-desaturase and/or Delta6-elongase activity. These desaturases and elongases originate advantageously from *Thalassiosira*, *Euglena* or *Ostreococcus*. Furthermore, the invention relates to a process for the production of oils and/or triacylglycerides with an elevated content of long-chain polyunsaturated fatty acids. In a preferred embodiment, the invention furthermore relates to a process for the production of arachidonic acid, eicosapentaenoic acid or docosahexaenoic acid and to a process for the production of triglycerides with an elevated content of unsaturated fatty acids, in particular arachidonic acid, eicosapentaenoic acid and/or docosahexaenoic acid, in transgenic plants, advantageously in the seed of the transgenic plant. The invention relates to the generation of a transgenic plant with an elevated content of polyunsaturated fatty acids, in particular arachidonic acid, eicosapentaenoic acid and/or docosahexaenoic acid, as the result of the expression of the elongases and desaturases used in the process according to the invention. The invention furthermore relates to recombinant nucleic acid molecules comprising the nucleic acid sequences which encode the polypeptides with Delta6-desaturase, Delta6-elongase, Delta5-desaturase and Delta5-elongase activity, either jointly or individually, and transgenic plants which comprise the abovementioned recombinant nucleic acid molecules. A further part of the invention relates to oils, lipids and/or fatty acids which have been produced by the process according to the invention, and to their use. Moreover, the invention relates to unsaturated fatty acids and to triglycerides with an elevated content of unsaturated fatty acids and to their use.

Abstract (de)

Die Erfindung betrifft in einer Ausführungsform ein Verfahren zur Herstellung von Eicosapentaensäure oder Docosahexaensäure sowie ein Verfahren zur Herstellung von Triglyceriden mit einem erhöhten Gehalt an ungesättigten Fettsäuren, insbesondere Eicosapentaensäure und/oder Docosahexaensäure, in transgenen Pflanzen vorteilhaft im Samen der transgenen Pflanze. Die Erfindung betrifft die Herstellung einer transgenen Pflanze mit erhöhtem Gehalt an mehrfach ungesättigten Fettsäuren, insbesondere Eicosapentaensäure und/oder Docosahexaensäure, aufgrund der Expression der im erfindungsgemäßen Verfahren verwendeten Elongasen und Desaturasen. Ein weiterer Teil der Erfindung betrifft Öle, Lipide und/oder Fettsäuren hergestellt nach dem erfindungsgemäßen Verfahren und deren Verwendung. Außerdem betrifft die Erfindung ungesättigte Fettsäuren sowie Triglyceride mit einem erhöhten Gehalt an ungesättigten Fettsäuren und deren Verwendung.

IPC 8 full level

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- [XP] WO 2005012316 A2 20050210 - BASF PLANT SCIENCE GMBH [DE], et al
- [T] DE 10219203 A1 20031113 - BASF PLANT SCIENCE GMBH [DE]
- [A] BEAUDOIN FREDERIC ET AL: "Heterologous reconstitution in yeast of the polyunsaturated fatty acid biosynthetic pathway", PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, NATIONAL ACADEMY OF SCIENCE. WASHINGTON, US, vol. 97, no. 12, 6 June 2000 (2000-06-06), pages 6421 - 6426, XP002200201, ISSN: 0027-8424
- [A] DOMERGUE F ET AL: "Cloning and functional characterization of *Phaeodactylum tricornutum* front-end desaturases involved in eicosapentaenoic acid biosynthesis", EUROPEAN JOURNAL OF BIOCHEMISTRY, BERLIN, DE, vol. 269, no. 16, August 2002 (2002-08-01), pages 4105 - 4113, XP002228745, ISSN: 0014-2956
- [A] ZANK T K ET AL: "Cloning and functional expression of the first plant fatty acid elongase specific for DELTA6-polyunsaturated fatty acids", BIOCHEMICAL SOCIETY TRANSACTIONS, COLCHESTER, ESSEX, GB, vol. 28, no. 6, December 2000 (2000-12-01), pages 654 - 658, XP002174836, ISSN: 0300-5127
- [T] DREXLER H ET AL: "Metabolic engineering of fatty acids for breeding of new oilseed crops: Strategies, problems and first results", JOURNAL OF PLANT PHYSIOLOGY, FISCHER, STUTTGART, DE, vol. 160, no. 7, July 2003 (2003-07-01), pages 779 - 802, XP002266491, ISSN: 0176-1617

- [T] MEYER ASTRID ET AL: "Novel fatty acid elongases and their use for the reconstitution of docosahexaenoic acid biosynthesis.", JOURNAL OF LIPID RESEARCH. OCT 2004, vol. 45, no. 10, October 2004 (2004-10-01), pages 1899 - 1909, XP009046591, ISSN: 0022-2275
- [X] DRUMMOND: "Re. GRAS Notification - Tuna Oil", 15 February 2002 (2002-02-15), XP055389590, Retrieved from the Internet <URL:https://www.fda.gov/downloads/Food/IngredientsPackagingLabeling/GRAS/NoticeInventory/ucm258378.pdf> [retrieved on 20170711]

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